

OVERVIEW OF 1998 RAILROAD EMPLOYEE FATALITIES

EXECUTIVE SUMMARY

This document, entitled “1998 Railroad Employee Fatalities: An Analytical Study,” was developed to promote and enhance awareness of many unsafe behaviors and conditions that typically contribute to railroad employee fatalities. By furthering our understanding of the causes of railroad employee fatalities, this report is intended to assist railroad industry stakeholders in their efforts to prevent similar tragedies.

This document contains the following materials:

- Narrative reports which provide in-depth coverage of 1998's 22 railroad employee fatalities, helping readers to visualize the accident scene and chain of events leading up to the fatalities, and the post-accident investigation process;
- *Summaries, preceding each narrative report, which highlight important elements of each individual fatality, particularly the possible contributing factors (PCFs).* This format allows the reader to walk through and analyze each fatality scenario, identifying ways the fatalities could have been prevented. PCFs are expressed as brief narrative statements such as “The Switchman Foreman got off moving equipment, in non-compliance with the railroad’s operating rules.”

The summaries also list Selected Factors which identify where and when the individual fatalities occurred, particulars about the fatally injured parties (i.e. age, years of service, training, and certification where applicable), craft and positions of the other workers, and major activities of fatally injured employees at the time of the incidents;

- *Overall findings for the 1998 fatalities (see Pages 2-6)* which identify *who* the majority of fatally injured employees were (i.e. craft, job position, age group, and years of service); *what* most were doing at the time of the incidents; *when* most were fatally injured (i.e. time of year and time of day); *where* most incidents occurred (i.e. type of railroad); and most importantly, *why* most fatalities occurred in terms of *PCFs*; and
- Bar and pie charts (*Appendices A through I*) which illustrate the above findings.

COMPLEXITY OF FATALITIES

Fatalities usually resulted from a chain of events or the errors of more than one individual, as revealed by the PCFs for each fatality. *In 1998, approximately 60 percent of all fatalities had three or more PCFs. Fatalities ranged in complexity from only one PCF to eight PCFs.*

As an example, Report FE-26-98 describes a very complex fatality which involved five Maintenance-of-Way (MOW) gangs who were working together on a main line without proper procedures and communication when one of the employees was fatally injured by a commuter train. The fatality involved the following eight PCFs:

- Gangs had overlapping track and time authorities, in non-compliance with regulations;
- Most workers received no briefing; the others received an inadequate one;
- Post-accident investigators concluded that the railroad's Roadway Worker Protection, On-Track Safety Program (RWP/OTS) had not been well monitored by railroad management;
- Radio communication was not properly relayed to all gangs;
- The train was cleared at excessive speed in multiple track territory before the work was stopped completely and all workers cleared from the area;
- Because of poor communication in clearing the track, not all workers were informed, including the fatally injured employee;
- The Engineer of an approaching commuter train stopped sounding the whistle too soon; and
- The Track Surfacing Gang Foreman was fouling the tracks when he was struck by the train, becoming fatally injured.

FINDINGS

WHO were most of the fatally injured employees?

- *Craft: Transportation and Engine (T&E) Employees*

In 1998, T&E employees represented approximately 54 percent of the fatalities, MOW employees approximately 32 percent, and Maintenance-of-Equipment (MOE) employees approximately 14 percent.

(See [Appendix A](#), 3-D pie chart entitled "1998 Railroad Employee Fatalities By Craft.")

- ***Position: Conductors***

In 1998, approximately 23 percent of all fatally injured employees were Conductors. The next largest groups, Trackmen and Engineers each represented approximately 14 percent of all fatalities.

(See [Appendix B](#), stacked bar chart entitled “1998 Railroad Employee Fatalities by Craft and Position.”)

- ***Experience: Very Experienced (21-35 Years of Service)***

Most fatally injured employees in 1998 were very experienced; approximately 54 percent had served 21-35 years. The very inexperienced, who served 0-5 years, ranked second at approximately 32 percent of all fatally injured employees.

(See [Appendix C](#), stacked bar chart entitled “1998 Railroad Employee Fatalities: Years of Service by Craft.”)

- ***Age Range: 36-55 Years***

In 1998, approximately 54 percent of all fatally injured employees were concentrated in the 36-55 age range. Younger employees in the 18-35 age range represented approximately 32 percent of all fatally injured employees. Older employees in the 56-65 age range represented 14 percent.

(See [Appendix C](#), cluster bar chart entitled “1998 Railroad Employee Fatalities: Age Ranges by Craft.”)

WHAT were most of the fatally injured employees doing when they were fatally injured?

- ***Activity: Switching or En Route via Highway Transportation***

In 1998, approximately 32 percent of fatally injured employees were involved in switching, and an equal percentage were fatally injured while traveling to and from the job site via highway transportation. Track maintenance ranked next, with approximately 14 percent of all fatalities in 1998. Other activities in which employees were fatally injured in 1998 included track repair, passenger service, activating switch heaters, air brake inspection, and going off-duty.

(See [Appendix D](#), stacked bar chart entitled “1998 Railroad Employee Fatalities by Craft and Activity.”)

WHERE did most of the railroad employee fatalities occur?

- ***Type of Railroad: Class I Freight Railroads***

In 1998, approximately 64 percent of all railroad employee fatalities occurred on Class I freight railroads, approximately 23 percent on Class II and III railroads, and approximately 13 percent on commuter/passenger railroads. These railroad categories employed approximately 78 percent, approximately 11 percent, and approximately 11 percent of the nation's total railroad employees, respectively.

(See [Appendix E](#), 3-D bar chart entitled "1998 Railroad Employee Fatalities by Type of Railroad.")

WHEN did most of the fatalities occur?

- ***Season(s): Fall or Winter***

In 1998, approximately 72 percent of all fatalities occurred in the fall or winter (approximately 36 percent each), while only approximately 5 percent occurred in the summer.

(See [Appendix F](#), pie chart entitled "1998 Railroad Employee Fatalities by Season of Year.")

- ***Time of Day: Day***

Data of the U.S. Naval Observatory, Astronomical Applications Department, provided the precise times for sunrise and sunset for the specific dates and locations of the fatalities. To distinguish fatalities which occurred during daylight from those which occurred during darkness, this analysis employs the definitions of "day" as at sunrise through sunset, and "night" as immediately after sunset until sunrise. In 1998, approximately 68 percent of the fatalities occurred during the day and approximately 32 percent during the night.

(See [Appendix F](#), pie chart entitled "1998 Railroad Employee Fatalities by Time of Day.")

WHY did most of the fatalities occur?

- ***Major PCF Categories in descending order:***

Train Operation and Human Factors
Miscellaneous Contributing Factors
Mechanical and Electrical Failures
Track, Roadbed, and Structures

- ***Most PCFs: Train Operation & Human Factors¹***

- In 1998, approximately 58 percent of all possible contributing factors (PCFs) to the 22 fatalities were Train Operation & Human Factors, followed by approximately 38 percent which were Miscellaneous Contributing Factors.²
- In 1998, approximately 3 percent of the PCFs involved Mechanical and Electrical Failures (specifically a crane's clutch had burned out, and a coupler was defective) and approximately 1 percent involved Track, Roadbed & Structures (a large opening in a bridge's railing).

(See [Appendix G](#), 3-D pie chart entitled *"1998 Railroad Employee Fatalities: Major Possible Contributing Factor Categories."*)

Break-down of Train Operation & Human Factors

- ***Of all the Train Operation & Human Factors in 1998, one specific sub-category predominated: Miscellaneous Human Factors, Track, at approximately 35 percent.*** This sub-category included non-compliance with Bridge Worker Safety requirements; no or inadequate provisions for RWP/OTS; fouling the track; unsafe crane operation; and inadequate crosswalk safety provisions.

¹During 1998, Train Operation & Human Factors included errors in the use of switches; improper speed; inappropriate or nonexistent hand, radio, and train signals; employee's condition; improper use of brakes; non-compliance with General Switching Rules; and miscellaneous human factors in Motive Power & Equipment (MP&E) and Track.

²Miscellaneous Contributing Factors, in 1998, included poorly prepared employees; highway accident factors; inexperience; environmental conditions; grade crossing accident factors; and contractual non-compliance.

- *Next prevalent at approximately 14 percent each were the following sub-categories: Hand, Radio, and Train Signals; General Switching Rules; and Miscellaneous Human Factors, MP&E.* The first sub-category included inappropriate or no use of radio signals or train signals such as horns, bells, ditch lights, and headlights. General Switching Rules included failure to couple, failure to avoid a close clearance structure, failure to remain clear of moving equipment, and failure to adequately separate equipment before stepping between it. Miscellaneous Human Factors, MP&E included getting on or off moving equipment, improper loading and unloading of passengers, and assuming the wrong position on the train to view the platform.
- *The remainder of Train Operation & Human Factors comprised the following sub-categories: Improper Use of Brakes and Excessive Speed at approximately 8 percent each; Employee's Condition at approximately 5 percent; and Improper Use of Switches at approximately 3 percent.* Together, these sub-categories comprised failure to secure hand brakes properly; failure to comply with restricted speed; operating a train inside the yard limits at excessive speed; clearing a train at excessive speed before workers had been cleared from multiple track territory; employee's impairment from fatigue or drugs; and lining switches improperly.

(See [Appendix H](#), cluster bar chart entitled "1998 Railroad Employee Fatalities: Train Operation & Human Factors Involved.")

Break-down of Miscellaneous Contributing Factors

- *The three sub-categories, Poorly Prepared Employees, Environmental Conditions, and Highway Accident Factors comprised approximately 71 percent of all Miscellaneous Contributing Factors (at 25 percent, 25 percent, and approximately 21 percent, respectively).* Poorly Prepared Employees included no or inadequate training, supervision, briefing, and communication. Environmental conditions included snow on the track, darkness without sufficient artificial lighting, black ice on the road, and heavy wind and rain. Highway Accident Factors included not wearing a seatbelt, driving left of the center line into oncoming traffic, speeding, non-compliance with STOP signs and other traffic control devices, and ruptured tires.

- *The remaining three sub-categories, Grade Crossing Accident Factors, Inexperience, and Contractual Non-Compliance, comprised approximately 29 percent of all Miscellaneous Contributing Factors (at approximately 13 percent, approximately 13 percent, and approximately 4 percent, respectively). Grade Crossing Accident Factors included a highway user's inattentiveness, violation of highway-rail traffic laws, and a highway user's lack of awareness due to environmental factors (i.e. no street light at a passive crossing at nighttime). Inexperience is self-explanatory. Contractual non-compliance concerned a container plant's failure to notify railroad management prior to installing a close clearance structure.*

(See [Appendix I](#), cluster bar chart entitled "1998 Railroad Employee Fatalities: Miscellaneous Contributing Factors.")